DOCUMENT PROCESSING WITH FLEXIBLE RESOLUTION AND OUTPUT STYLE

This application is a reissue of U.S. Patent No. 5,867,637, which issued from application Ser. No. 08/334,000, filed November 2, 1994, which is a continuation of application Ser No 07/971,679, filed Nov 4, 1992, now abandoned, which was a continuation of application Ser No 07/550,568, filed Jul 10, 1990, now abandoned

BACKGROUND OF THE INVENTION

1 Field of the Invention

The present invention relates to a document processing system in which a print image is stored into a memory and can be handled as output data

2 Related Background Art

In recent years, owing to the development of the techniques of image processing using a computer, a document can be formed, edited, and arranged by a computer, an image such as character data, figure data, image data, or the like included in the document is stored into a memory, and a printer output can be obtained from a bit image Such a system has data of a specific image pattern (hereinafter, referred to as font data) of each character and its set width A system called a WYS-WYG (What You See Is What You Get) which in editing can execute operations while displaying on a CRT the result of the same form (indicative of the electronic form in the present invention) as that upon printing, is main-stream. Upon printing, the font data is stored in the memory on the basis of the result of the form On the other hand, a figure is drawn and image data is stored at a designated position on the basis of figure data (vector information). The image data is output by a printer which can execute a digital control based on the bit image in the memory

The above system has font data, a form logic, an image memory printer, and the like in the system and can solely execute total document processes. In recent years, such a system is called a DTP (desk top publishing system) and has been highlighted

However, the performance of the above DTP shown as a conventional example is inferior to that of a large-scale system having a computer-aided phototypographic composing machine or the like.

The following reasons are considered as causes.

First, there is a difference between resolutions of final outputs The resolution of the DTP is set to about 400 dpi and that of the large-scale system is set to a value of 1200 to 2400 dpi or more. A bit image of 400 dpi of the A4 size requires 2 Mbytes even in the case where the bit image is constructed by binary data. To raise the resolution to 1200 dpi, 18 Mbytes, nine times as much as 2 Mbytes, are needed. Such a large capacity results in high costs of the memory and, as the quantity of data which is handled by the CPU used in the existing DTP, is a larger burden. In addition, local installation of such a printer is expensive.

Second, there is a difference between the kinds of font data. In the DTP, a few kinds, e.g., Ming-style type, Gothic type, and the like are provided. The large-scale system has a large number of various font data.

Therefore, the data which results from the form of the DTP is converted into data of the input form for the large-scale system and is output. On the large-scale system side, substantially the same form and style are derived, while an output of a high resolution is obtained by using a large number of various font data. However, it is difficult for the DTP to obtain substantially the same style as that of the

result which was locally output because of differences between the form logics or between the font data There is a drawback that editing or checking of work on the large-scale system side for the above adjustment is inevitable

SUMMARY OF THE INVENTION

In consideration of the above points, it is an object of the present invention to provide a document processing system in which by providing a method whereby a bit image is stored into a memory on the DTP side in a manner similar to the case of the local printing and is converted into data for image data storage of an external printing system and is output to the external printing system, output of substantially the same style as that of the local print result on the DTP side can be obtained by the external printing system.

In consideration of the above points, another object of the invention is to provide a document processing system in which by providing a method whereby a bit image is converted into an image of the size which is larger than an actual size and is stored into a memory and is supported in a manner such that the bit image is converted into data for image storage of an external printing system and is output with the original size, output of a high resolution and substantially the same style as that of the local print result on the DTP side can be obtained by the external printing system.

In consideration of the above points, still another object of the invention is to provide a document processing system comprising: forming means for forming a document; converting means for converting the document data formed by the forming means, into data of bit map style; and controlling means for controlling whether the conversion by the converting means is executed in accordance with the size based on the document data or not in the case where the data of the bit map style which is converted by the converting means is made correspond to the data format of a page description language.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a block diagram of a document processing system according to an embodiment of the invention,

FIG. 2 is a data format of an external printing system,

FIG. 3 is a diagram showing a sample document;

FIG. 4 is a diagram showing an example of output data output to the external printing system according to the first method;

FIG. 5 is a diagram showing an example of output data output to the external printing system by the second method;

FIG. 6 is a processing flowchart;

FIG. 7 is a diagram showing a document data format which the document processing system inherently has;

FIG. 8 is a diagram showing data in the case of executing a variable magnification output by the second method; and

FIG. 9 is a flowchart showing the case of executing the output in accordance with the data shown in FIG. 8.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

An embodiment of the present invention will be described hereinbelow with reference to the drawings.

FIG. 1 is a block diagram of a document processing system in an embodiment according to the invention. The system in the invention may be constructed by a plurality of apparatuses or can be constructed by a plurality of systems

each comprising a plurality of apparatuses Or, the system may be constructed of a single apparatus. The system of the invention also incorporates the case of implementation by supplying a program to a computer such as a personal computer or the like by using an FD or the like The document in the invention can also include character data, figure data, image data, form data, and the like

In the diagram, reference numeral **1** denotes a CRT display which is used on the basis of the raster scanning type, **2** indicates a video RAM (VRAM) to store display pattern information of one picture plane; **3** a display controller to control the writing operation of the pattern information into the VRAM **2** and the reading operation to the CRT; **5** a main memory having areas to store control programs and document data; and **4** a micro-processor (MPU) to execute main control of the system. A keyboard **8** to execute an inputting operation of character data and the like and other processes and a pointing device **9** for performing the designation of a position on the CRT and the like and executing an inputting editing process on figure data and the like, are connected to the MPU **4**. Reference numeral **6** denotes a hard disc into which document files and character fonts are stored, **10** indicates a printer to output the document formed, and **11** a floppy disc to execute the storage and the like of document files or the like. Each of the above blocks is connected by an I/O bus.

A document processing application program is constructed in the system and various document processing functions are provided. The above blocks are called DTP machines and have been described in detail in Japanese Patent Application No. 62-289142 (laid open as kokai 1-30256) and the like. In the above system, in the case of obtaining a local output by using the printer **10**, the font data, figure data, image data, and the like are stored as a bit image into the main memory **5** and the data in the main memory is output to the printer. The printer **10** prints for each point in the image either a black dot or a blank dot onto the paper surface in accordance with whether a bit image of "1" or "0" is output from the main memory and outputs an image.

In the case of outputting the same document to an external printing system, processes are executed in the following manner The "external printing system" is an output apparatus for a phototypographic composing machine of high resolution or the like. For instance, such apparatuses are commercially available under trade names such as "Varityper", "Compugraphic", "Linotype", and the like. Those apparatuses correspond to, for example, a page description language (hereinafter "P D L ") such as a PostScript or the like. Another output apparatus such as the PC-PR602PS (made by Nippon Electronic Co., Ltd) or the like can be also used. It is now assumed that the system has a data input format as shown in FIG. **2**. Although the actual system receives a greater number of commands, it is assumed that the system has the data format as shown in FIG. **2** for simplicity of explanation.

To allow the external printing system to output document data as shown in FIG. **3** in accordance with the data format shown in FIG. **2**, it is sufficient to transmit data shown in FIG. **4**. FIG. **7** shows a format of the document data which the document processing system inherently has. The document data is converted into the data shown in FIG. **4**. It is sufficient to execute such a conversion by using, for instance, a table stored in the main memory **5** or hard disc **6**. In FIG. **7**, size data (for instance, "A4") and kind data (for example, "figure") are first stored. In the case of a figure, data indicative of the number of figures and coordinate dot train data are stored. In the case of a character, form data,

character number data and character code are stored. In the case of an image, name data of an image file stored in the hard disc **6** and the like are stored in, e.g., the main memory **5** as document data corresponding to one page. File size and the like are obviously stored in the image file. The figure data is converted into line data (**2100, 1500**), . shown in FIG. **4** or the like by using the above table.

It is now assumed that the external printing system can receive the data of FIG. **4** by an ASCII code. The data can be transmitted through a floppy disc or by a communication using a communication interface such as RS232C, Sentro, or the like.

Due to this, the external printing system can output the data of FIG. **3** with the resolution of the external printing system. However, when considering the character output portion, although the same TIMES FORM is used as a form, since the data is output by the font data of the external printing system, those forms are not always the same form. Although there is a case where the style changes, the above method is suitable in the case of obtaining data of a high resolution. On the other hand, in the case where external character data which was originally designed by the DTP is included in a character train, such external character data cannot be output.

The DTP has the following second output method different from the first output method to the external printing system as mentioned above. The user can select either one of the first and second output methods.

That is, the document data of FIG. **3** is stored into the main memory **5** in a manner similar to the case of once outputting data to the system's own printer. The whole document is handled as an image by using the bit image and data of FIG. **5** is output. In this case, since the bit image stored by using the font, external characters, etc. on the DTP side is sent, the output of substantially the same style is also obtained by the external printing system. In FIG. **5** (in the case of equal-magnification output), the "sheet" data designates that the size to be output is set to A4. Therefore, the image shown in FIG. **3** is output as the image data of the A4 size by executing the correction of the dot level on the basis of the difference of the resolution (for instance, between 400 dpi and 1200 dpi, between 400dpi and 320 dpi, etc.). For instance, one dot is converted into 3x3 dots or the process opposite to the above process or the like is executed.

[Flowchart]

The outputting operation by the MPU **4** based on the program stored in the main memory **5** in FIG. **1** will now be described with reference to FIG. **6**. First, the user of the document processing system indicates an icon which is displayed on the CRT display **1** by using a pointing device **9**, thereby making it possible to instruct the apparatus as to whether the external printing system is used or not (S1 in FIG. **6**), and as to whether the method **1** is used or the method **2** is used, in the case of using the external printing system (S2 in FIG. **6**).

In step S1, if it is determined that the external printing system is not used, step S3 follows and the bit map data corresponding to the document data is stored into the main memory **5** and is output to the printer **10**.

On the other hand, if it is determined that the external printing system is used (S1) and the data is output by using the output method **1** (S2), the processing routine advances to step S5 and the data shown in FIG. **7** is converted into the data of FIG. **4** in a manner as mentioned above. On the other hand, if it is determined that the data is output by using the second output method, the bit image to be output is stored into the main memory **5** (S6). A code corresponding to the